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ABSTRACT

A questionnaire was sent to 1,705 Texas farmers and ranchers who had either purchased farm management software provided by the Texas Agricultural Extension Service (purchasers) or had participated in Extension Service short courses and had purchased farm management software (participant/purchasers). A total of 489 farmers/ranchers responded. Results indicated that the two groups differed little between themselves, but that they differed from the general Texas farming/ranching community. In particular: (1) the study groups had a higher level of education and higher gross on-farm income; (2) 62 percent of the study groups reported livestock as their major agricultural activity compared to 74 percent for the general population; (3) both purchasers and participant/purchasers had owned a computer for longer than 4 years, had spent about the same amount on computer-related training, and believed that their computers had already paid for themselves; (4) more purchasers than participant/purchasers indicated that their major agricultural activity was livestock; (5) the study groups were satisfied with the farm management software and short courses; (6) respondents were able to incorporate software into their farming and ranching operations; and (7) respondents indicated a high level of use and knowledge of farm business management tools. (74 references) (NLL)

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PERCEPTIONS AND ATTITUDES OF FARMERS AND RANCHERS CONCERNING TEXAS AGRICULTURAL EXTENSION SERVICE COMPUTER-BASED FARM MANAGEMENT SHORT COURSES AND SOFTWARE

A Summary Report of Research Performed
in Cooperation With the

Economist-Management Group
Texas Agricultural Extension Service and the Departments of
Agricultural Economics and Agricultural Education

by

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FOREWORD

The microcomputer revolution is spreading through many areas of agriculture and is perceived by many as being a management tool that will help producers remain in business. However, the rate of diffusion among farmers who could use microcomputer technology has been slow. Questions have arisen as to the effect that programs to diffuse such technology among farmers and ranchers have had and also as to whom is the relevant audience for such programs. Consequently, Dr. Donald E. Breazeale undertook a study to determine the perceptions and attitudes of selected farmers and ranchers in Texas concerning the use and benefits of computer-based farm and ranch management programs sponsored by the Economist-Management Group of the Texas Agricultural Extension Service.

The findings, conclusions, implications, and recommendations of Dr. Breazeale's research summarized herein have contributed further to developing a more complete picture of farmers and ranchers who have been using new technology in the form of computer-based farm management software in their agricultural operations and/or have participated in computer-based farm management short courses. While the research was conducted in Texas, the findings and conclusions raise questions that should be considered by people in other states who are working with similar clienteles. This is especially true when considering how different these users of computer technology were from the general farm and ranch population in Texas, different demographically and with respect to whom they went for information and advice about farm computer technology..

For further information about the research, the reader may wish to contact Dr. Breazeale through his permanent mailing address of 1301 Dakota Avenue, Modesto, California 95351.

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PERCEPTIONS AND ATTITUDES OF FARMERS AND RANCHERS CONCERNING TEXAS AGRICULTURAL EXTENSION SERVICE COMPUTER-BASED FARM MANAGEMENT SHORT COURSE AND SOFTWARE

INTRODUCTION

Television, radio, and news releases constantly remind the American public of the plight of the farmer (Sidey, 1988). As with any entrepreneurs, only those farmers exhibiting innovative characteristics are likely to succeed over an extended time period. Farm and ranch management has become an increasingly complex task. New technologies are appearing so rapidly that managers are hard pressed to keep abreast of new developments.

Between 1950 and 1980, total U.S. crop production doubled with a 5% increase in cropland and a 63% reduction in labor use. U.S. farmers were so productive that agricultural policies were dominated by farm surplus problems (Carlson, 1987). New varieties, improved cultural practices, and management techniques were largely responsible for these phenomenal increases in production.

Unfortunately, for the unprepared farm manager, economic conditions and management practices accompanying these new production systems have changed. While production is vital, a farm operator unprepared to meet the challenges of a dynamic and changing business management atmosphere probably will not survive. The Office of Technology Assessment (OTA) (1985) estimated that there

were 300,000 farms in the United States with 1982 gross receipts in excess of $100,000 annually. In 1982, 28,000 farms had annual sales in excess of $500,000 (Reimund, Stucker, & Brooks, 1987).

These figures represent a continuing change in farm and ranch demographics. One of these changes has been the steady increase in farm size and a corresponding decrease in numbers of farms and ranches. The OTA (1985, p. 3) stated that, "if these trends continue, small and part-time farms are likely to disappear ... and large and very large farms will completely dominate agriculture." Those who are left are having to adjust their management practices to survive.

Kay (1981, p. 4) stated, "Present and future managers will need to improve and update their management skills continually in order to make the correct decisions when faced with new and changing problems." To help the farm and ranch manager meet these increasingly complex management tasks, the Cooperative Extension Services in several states have appropriated money to disseminate computer technology. In addition, private grants have supported the diffusion of this technology. The Texas Agricultural Extension Service (TAEX), to demonstrate this technology, created the Year 2000 Computerized Farm Project. This project was made possible by grants and gifts totaling $1,200,000 and provided by the W.K. Kellogg Foundation, Texas Instruments, Inc., Dow Chemical Company, Stiles Farm Foundation, software vendors, and others. The purpose of the project is to demonstrate how to apply computer technology to

all aspects of a large commercial farming operation (McGrann and Lippke, 1987).

Statement Of The Problem

A microcomputer is a management tool capable of helping farm and ranch managers allocate their limited resources in a more profitable manner (Stanley, 1979). Proponents of providing computer information technology assume that the computer revolution will solve many of society's problems and that virtually everyone will have one (Smith, 1980; Evans, 1979). However, though some farmers have incorporated computers into their operations, the rate of diffusion among farmers who could use such technology has been slow (Yarbrough and Scherer, 1984). While the Texas Agricultural Extension Service continues to facilitate the adoption of computer technology through educational programs, questions remain as to: (1) what effect the programs are having, and (2) most importantly, who is the relevant audience for those educational efforts.

The problem is that there is insufficient information to answer these questions accurately or to determine what influence technology transfer programs, such as the Year 2000 Computerized Farm Project, are having among the participating farmers and ranchers in Texas. Two major educational efforts have emerged from the latter project: the use of three-day intensive computer short courses and the development and distribution of farm management computer software. As of June 1988, more than 1,650 (TAEX News,

July 1988) people had attended short courses and more than 20,000 pieces of farm management software had been provided to a wide variety of people. Of these people, an estimated 1,000 were farmers and ranchers. There is a need to determine what effect these educational efforts are having on the Texas farm and ranch community, the characteristics of the farmers and ranchers who appear to be the relevant audience, and the perceptions that the relevant audience of farmers and ranchers have concerning the benefits derived from such efforts.

Purpose Of The Study

The purpose of the study was to determine the perceptions and attitudes of selected farmers and ranchers in Texas concerning the use and benefits of computer-based farm and ranch management programs sponsored by the Economist-Management Group of the Texas Agricultural Extension Service. These selected farmers and ranchers (1) had purchased farm management software provided by the Extension Service (purchaser), or (2) had participated in Extension Service short courses as well as had purchased farm management software (participant/purchaser).

To accomplish the purpose of the study the following objectives were identified:

1. Compare farming and ranching operations and demographic characteristics identified of selected Texas farmers and

ranchers to those of the general Texas farming and ranching population.

2. Compare farming and ranching operations and demographic characteristics of selected Texas purchasers to those of participant/purchasers.
3. Compare the degree of satisfaction of purchasers with that of participant/purchasers.
4. Compare the degree of modification and incorporation of farm management software by purchasers and by participant/purchasers.
5. Compare the level of use of farm business management tools between purchasers and participant/purchasers.
6. Compare the influence, if any, that purchasers and participant/purchasers believed they have had on the adoption of computers by other farmers and ranchers.
7. Compare the self-perceived impact and benefit of selected computer technology on the farm or ranch business of purchasers and of participant/purchasers.
8. Determine the relationship, if any, among the factors of satisfaction, modification and incorporation, economic and financial knowledge, influence on other farmers and ranchers, and self-perceived impact or benefits of adoption.

Hypotheses

Null hypotheses were established to examine whether or not differences existed between the two groups studied.

1. There is no significant difference in the farming or ranching operations and/or demographic characteristics of purchasers and of participant/purchasers.
2. There is no significant difference in degree of satisfaction of purchasers and of participant/purchasers.
3. There is no significant difference between purchasers and participant/purchasers regarding the self-perceived impact or benefit of adopting computer technology.
4. There is no significant difference in the degree of modification and incorporation of farm management software into farming and ranching operations between purchasers and participant/purchasers.
5. There is no significant difference in the use of business management tools between the purchasers and participant/purchasers.
6. There is no significant difference between purchasers and participant/purchasers concerning the amount of influence they have had on the adoption of computers by other farmers and ranchers.
7. There is no significant relationship among or between the factors of satisfaction, modification and incorporation,

economic and financial knowledge, influence on other farmers and ranchers, and self-perceived benefits.

Research Questions

Besides the hypotheses tested, two research questions were formulated. The first question solicited descriptive data about the purchasers and participant/purchasers. The second question concerned the respondents' perception of themselves as opinion leaders.

1. How do the farming and ranching operations, as well as the demographic characteristics, of purchasers and participant/purchasers compare to those of the general farming population?
2. Do purchasers and participant/purchasers perceive themselves as influencing other farmers and ranchers to adopt computer technology?

Significance Of The Study

The OTA (1985) and Peter Drucker (1986) reported that continuing rapid advances in information and biotechnology and the world economy promised to revolutionize agricultural production and to alter dramatically the structure of the U. S. agricultural sector. These changes demand accompanying educational changes or approaches by those institutions seeking to serve the innovative farmers and ranchers who adapt to the information age (Dillman,

1986; Sonka, 1985). Given that the use of selected computer services is being emphasized by the Economist-Management Group of the Texas Agricultural Extension Service through short courses and the dissemination of software in its attempts to assist farmers and ranchers adapt to the age of information, it is appropriate to determine the influence of these three-day short courses and the use and diffusion of farm management software on farmers and ranchers as perceived by them. Given that these selected services have been in existence for only four years, this is an excellent time to seek feedback from the clientele. Consequently, it was perceived that the results of this study would allow the Texas Agricultural Extension Service to refine its educational program, if needed, in attempting to assist the Texas agricultural community to meet the challenges of the future.

RESEARCH PROCEDURE

In order to accomplish the objectives of this study, a modified closed-form questionnaire was developed, reviewed, and mailed to the 1,705 individuals identified as the potential population of Texas farmers and ranchers who have either purchased software and/or attended a computer-based farm management short course. A closed-form questionnaire was determined to be appropriate for this type of research project (Borg & Gall, 1979). Other forms of data collection were ruled out due to the size of the population (Dillman, Christenson, Carpenter, and Brooks, 1974; Dillman, 1978). The four page questionnaire booklet contained a total of 27 questions. The format of the questionnaire included five-point Likert-type scales, a seven-point semantic differential, and multiple choice selection.

The questionnaire was reviewed several times by the researcher's advisory committee, members of the agricultural economics faculty at Texas A & M University, the Economics-Management Group of the Texas Agricultural Extension Service, and the farming personnel of the Texas A & M Plantation Farm. After these reviews for accuracy and subject matter relevancy, changes and corrections were made. To determine instrument reliability, Cronbach's coefficient alpha was calculated for each of the seven objective area scales plus three subscales within the semantic differential. The lowest reliability coefficient was .618 and the

highest was .940. The coefficients indicated that the instrument's scales were internally consistent.

On April 10, 1989, a jointly signed cover letter from Dr. James M. McGrann of the Extension-Management Group of the Texas Agricultural Extension Service and this researcher along with an appropriately coded survey instrument and a self-addressed return envelope were mailed to the 1,705 potential Texas farmers and ranchers identified as the population. On April 28, 1989 a reminder letter was sent to try and solicit more responses.

Due to a low return rate of only 28.3%, a second mailing was made on May 11, 1989. The second mailing again included a cover letter from Dr. McGrann and this researcher, a survey instrument, and a self-addressed return envelope. By June 12, approximately two months after the initial mailing, a total of 883 responses had been received. Of this total, 394, or 44.6% indicated that they were not farmers or ranchers. If this number was representative of all 1,705 individuals included in the initial mailing, then the number of farmers and ranchers in the initial mailing would total 945. By June 11, 1989, 489 farmers and ranchers had responded to the questionnaire. This represents 51.7% of the estimated 945 farmers and ranchers in the study.

Data generated from the questionnaire were first coded for computer analysis. Data entry and verification was performed by the Special Services section of the Texas Agricultural Extension Service. After data were encoded, modifications were made to allow

the use of the Statistical Package for Social Sciences (SPSS) (SPSS, Inc., 1986). Descriptive measurements of central tendency (Little and Hills, 1978; Borg and Gall, 1979), comparative statistics, and correlational analysis were used to analyze the data for the two groups of farmers and ranchers.

The following is a brief matrix of the statistical tools that were used to analyze the data.

Matrix of Statistical Tools

	Correlation Analysis	Descriptive Statistics	Comparative Statistics
Hypotheses			
#1			X
#2			X
#3			X
#4			X
#5			X
#6			X
#7	X		
Research Question			
#1		X	
#2		X	

RESEARCH FINDINGS

The findings revealed that the Texas farmers and ranchers involved in this study were unique. While not listed as a specific objective, a general description of the respondents was compiled. Seven demographic characteristics are listed in Table 1.

Table 1

Demographic Characteristics of TAEX Farm Management Software Purchasers/Short Course Participants, Texas, September 1984 - March 1989.

Characteristic	Central Tendency
	Means
Years of Computer Ownership	4.3 years
Amount Spent On Computer Training	$478
	Modes
Computer has paid for itself	52.8%
Educational Level	College Degree
Major Agricultural Activity	
Livestock	62.2%
Crops	37.8%
	Grouped Data Means
Gross Farm/Ranch Income	$211,326
Gross non-farm/Ranch Income	$ 88,874

Findings Related To Objective One

The findings for objective one concerned a comparison of the farming and ranching operations as well as the demographic characteristics of the survey respondents to those of the general Texas farming and ranching population. The findings are as follows:

1. More than 70% of the study group, compared to only 19% of the general population, had a bachelor's degree or higher. In addition, fewer than 10% of the study group had a high school diploma or less education as compared to 55% for the general Texas farming/ranching community.
2. The study group's mean level of gross on-farm income was $211,326 compared to $48,299 for the general Texas farming/ranching community.
3. The respondents reported a mean of $88,907 for gross off-farm income. Comparable data were not found for the general Texas farming and ranching population. Secondary sources did reveal, however, that 61% of the general population working off-farm 200 days or more had $2,500 or less of farm income. In addition, 12% of the general population working 200 days or more had farm income of $100,000 or more.
4. Sixty-two percent of the study group reported livestock as their major agricultural activity while the other 38% listed crops. This compared to 74% and 26%, respectively, for the general Texas farming and ranching population.

Findings Related To Objective Two

To accomplish this objective, the farming and ranching operations as well as demographic characteristics of Texas purchasers of TAEX farm management software were compared with those of TAEX short course participant/purchasers. The study revealed the following information:

1. Both groups reported owning a computer for longer than four years.
2. The participant/purchasers spent $400.39 and the purchasers $617.42 on computer-related training activities.
3. Only 6% and 10% of the participant/purchasers and purchasers, respectively, believed that their computers would never pay for themselves. On the other hand, 58.8% and 50.9% of the participant/purchasers and purchasers, respectively, believed that their computers had already paid for themselves.
4. Ten percent of the participant/purchasers were found to have formal educational levels of a high school diploma or below, while fewer than 7% of the management software purchasers indicated having that level of education. More of the purchasers (25.3%) held graduate degrees than did the participant/purchaser group (20.4%).
5. Almost 25% of the purchasers had less than $20,000 of gross on-farm or ranch income, while only 18.5% of the

participant/purchasers reported that level of income. At the other end of the income scale, 16.5% of the participant/purchasers and 10.7% of the purchasers reported earning $500,000 or more.

6. Nearly 25% of the participant/purchasers and slightly more than 16% of the purchasers reported less than $10,000 of gross off-farm income. At the upper income levels, 14% of the participant/purchasers, but more than 28% of the purchasers, reported off-farm incomes in excess of $100,000.
7. Almost 59% of the participant/purchasers and 68% of the purchasers indicated that their major agricultural activity was livestock. Their other agricultural activities were agronomic operations.

Findings Related To Objective Three

Objective three related to the level of satisfaction of both groups with the activities of the Texas Agricultural Extension Service for both groups. In addition, the level of satisfaction with TAEX software and short courses was determined. All ratings were on a five-point scale.

The mean satisfaction ratings for TAEX farm management software was 3.39 for both groups combined. When compared to farm management software acquired from other sources, the TAEX software rating was 3.28. Mean satisfaction level for short course participation was 3.68.

Findings Related To Objective Four

This objective examined the respondents' ability to modify and incorporate software into their farming and ranching operations. All ratings reported were based on five-point scales. Both groups reported means of slightly more than three. Participant/purchasers rated their ability at 3.15 and purchasers at 3.02.

Findings Related To Objective Five

Achieving this objective determined the level of use of farm business management tools by the purchasers and participant/purchasers. These ratings covered such financial methods as balance sheets/net worth statements, enterprise and cash flow budgets, accrual income statements, and farm/ranch accounting. Again, both participant/purchasers and purchasers had group mean ratings for all of the farm business management tools of just over three, 3.04 and 3.01, respectively, on a four-point scale.

In addition, over 75% of the total respondents reported knowing how to use the methods listed. Of the total, approximately 33% reported using a computer when utilizing the farm business management tools. An important note, just over 20% reported they did not use any of the management tools. The percentage of respondents indicating use of the farm business management tools with a computer ranged from a low of 32.5% for accrual accounting to a high of 58.6% for farm/ranch accounting procedures.

Findings Related To Objective Six

The findings for this objective were the result of comparing the influence, if any, that purchasers and participant/purchasers believed they had on the adoption of computers by other farmers and ranchers. Respondents used a two-point scale (1=no opinion leadership, 2=strong opinion leadership). The participant/purchaser mean level of opinion leadership was 1.69 and that of the purchasers was 1.65.

Findings Related To Objective Seven

The findings for this objective are the result of comparing the self-perceived impact and benefit of computer technology on the farm or ranch business of purchasers and participant/purchasers. To accomplish this objective a semantic differential was used. The semantic differential employed is shown in Figure 1. The semantic differential was made up of 15 pairs of contrasting words, with each pair assessed on a seven-point scale. In addition, combinations of words were established to form three subscales. The overall mean rating for the participant/purchasers was 5.27 and for the purchasers 5.35, positive ratings of self-perceived impact and benefits of computer technology well above the midpoint on the scale of 3.5. The mean ratings for the subscales ranged from a low of 4.58 to a high of 5.80.

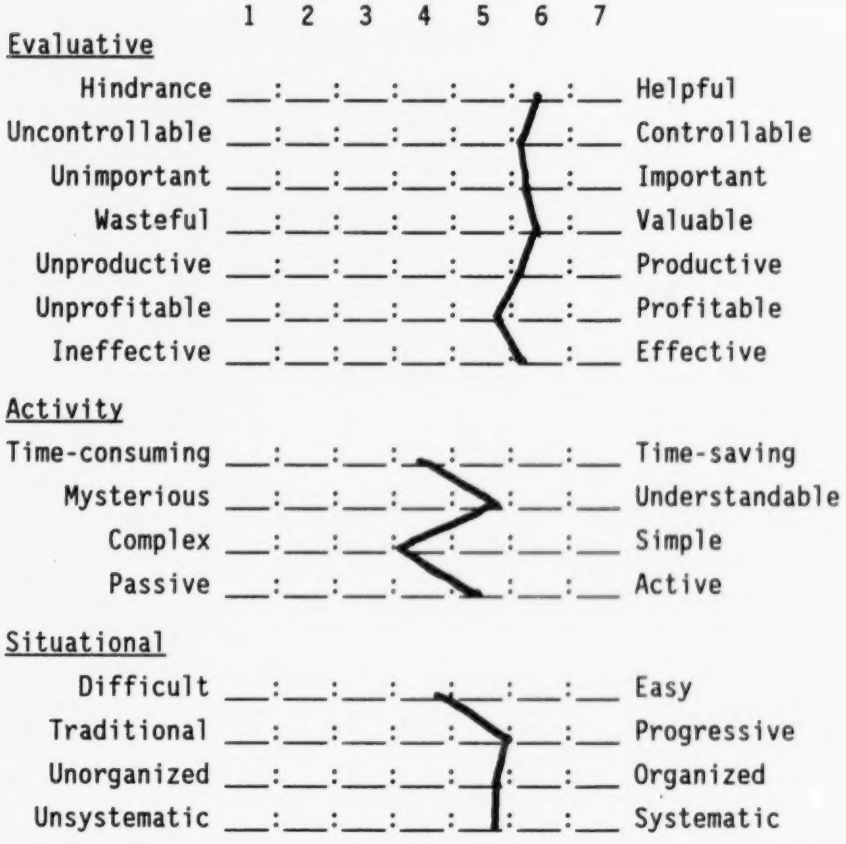
1 2 3 4 5 6 7
Evaluative
Hindrance : : : : : : Helpful
Uncontrollable : : : : : : Controllable
Unimportant : : : : : : Important
Wasteful : : : : : : Valuable
Unproductive : : : : : : Productive
Unprofitable : : : : : : Profitable
Ineffective : : : : : : Effective
Activity
Time-consuming : : : : : : Time-saving
Mysterious : : : : : : Understandable
Complex : : : : : : Simple
Passive : : : : : : Active
Situational
Difficult : : : : : : Easy
Traditional : : : : : : Progressive
Unorganized : : : : : : Organized
Unsystematic : : : : : : Systematic

Figure 1.

Combined Group Mean Responses about Computer Benefits by TAEX Farm Management Software Purchasers and Short Course Participants, Texas, September 1984 - March 1989. (N=393)

Findings Related To Objective Eight

The findings for objective eight consist of Pearson product-moment coefficients showing the relationships among the variables of satisfaction, modification and incorporation, economic and financial expertise, influence on other farmers and ranchers, and self-perceived benefits. The product-moment coefficients ranged from a high of .51 to a low of .01. The highest coefficient (.51) corresponded to the relationship found between opinion leadership and self-perceived benefit of adopting computers.

Additional Findings

While two open-ended questions were not related to specific objectives, they did yield further information. The first question concerned the major limitations faced by the respondents in using computers in their farming and ranching operations. The following is a listing by percentages of the major limitations cited by the respondents:

1. The biggest limitation cited in using computers was a lack of time (42.4%).
2. The adaptability or usefulness of available hardware and software was mentioned by 26.4% of the respondents.
3. A lack of computer knowledge and/or training was cited by 17.1%.
4. A need for more accurate input information and/or trouble in understanding the output was cited by 8.7%.

The second question asked for suggestions that the Texas Agricultural Extension Service might implement to help overcome the previously mentioned limitations. There were four major areas of suggestions.

1. Additional training was mentioned by 46.5% of the respondents.
2. A desire for more "user friendly" and applicable software was cited by 40.6%.
3. A need for training in such areas as mathematics, accounting, economics, and finance received 8.7%.
4. About 4% of the respondents mentioned a desire for computerized news services and marketing information.

Conclusions

The conclusions for this study are based on the major findings from the data collected and analyzed in this investigation.

Conclusions Related To Objective One, Research Question One

To accomplish this objective, the level of education, gross farm/ranch income, gross off-farm income, and major agricultural activity of the two combined study groups were compared to the general Texas farming and ranching population. The accompanying research question resulted in the following conclusions:

1. It was concluded that educational differences existed between the study's population and the general Texas farming and ranching population because the study group

had a higher level of education (70% with college degrees) than the general Texas farming and ranching community (20% with college degrees).

2. It was concluded that a considerable difference existed between the amount of gross on-farm/ranch income reported by the study group when compared with that of the general Texas farming and ranching community because the study group's mean gross on-farm income ($211,326) was more than four times the mean ($48,299) of the general population.
3. There was a negative relationship between on-farm income and off-farm income for both the study group and the general Texas farming and ranching population. As on-farm income decreased, off-farm income increased.
4. Both the study group and the general Texas farming and ranching population were much more oriented toward livestock production than to agronomic endeavors by ratios of 1.6:1 and 2.8:1, respectively.

Conclusions Related To Objective Two, Hypothesis One:

This objective and associated hypothesis compared several demographic and production characteristics of the purchasers to the same characteristics of the participant/purchasers. It was concluded that:

1. The null hypothesis was not rejected as there was no significant difference ($p > .05$) between the purchasers

and the participant/purchasers when comparing the years of computer ownership.

2. The null hypothesis was rejected because there was a significant difference ($p < .05$) between the two groups concerning the amount of money spent for computer training activities. The mean difference was $200 between the groups, out of a maximum mean of $617.42 reported, with the purchaser group clearly spending the most money.
3. The null hypothesis was rejected because a significant difference ($p < .05$) existed between the groups concerning the belief as to whether or not their computers would pay for themselves. The vast majority of respondents, with purchasers more optimistic than participant/purchasers, believed that their computers had already or would pay for themselves.
4. The null hypothesis was rejected because the purchasers and participant/purchaser were significantly different ($p < .05$) when comparing their levels of education as, overall, purchasers had a higher level of education than did the participant/purchasers.
5. The null hypothesis was rejected in that the amount of gross off-farm income was significantly different ($p < .01$) between the two groups. The purchaser group had a higher level of off-farm income than did the participant/purchaser group.

6. The null hypothesis was rejected when a comparison of type of agricultural production activity showed there was a significant difference ($p < .05$) between groups. The purchaser group was more oriented toward livestock activities and the participant/purchaser group toward cropping, or agronomic activities.
7. The null hypothesis was rejected because the groups were significantly different ($p < .05$) when comparing levels of gross on-farm income. The participant/purchaser group had a higher level of income from farming and ranching operation. It was further concluded that this was the only factor examined for which significant differences existed between the two groups in which participant/purchasers ranked higher than purchasers.

Conclusion Related To Objective Three, Hypothesis Two:

The null hypothesis was rejected because there was a significant difference ($p < .01$) between the groups concerning their levels of satisfaction with TAEX farm management software. The participant/purchaser group was more satisfied with the TAEX farm management software than was the purchaser group.

Conclusion Related To Objective Four, Hypothesis Four:

The null hypothesis was not rejected because there was no significant difference ($p > .05$) between the purchasers and the participant/purchasers regarding their abilities to modify and

incorporate TAEX farm management software into their farming and ranching operations.

Conclusion Related To Objective Five, Hypothesis Five

The null hypothesis was not rejected because there was no significant difference ($p > .05$) between the two groups concerning their level of use of farm business management tools.

Conclusions Related To Objective Six, Research Question Two, Hypothesis Seven:

The null hypothesis was not rejected because no significant difference was found between the purchasers and the participant/purchasers concerning their influence on others to adopt computers. Furthermore, the means of 1.69 and 1.65 indicate that the respondents are not particularly strong opinion leaders. However, both groups stated they were asked by other farmers and ranchers about their computers and that the respondents were generally good sources of information concerning farm computers.

Conclusion Related To Objective Seven, Hypothesis Three:

The null hypothesis was not rejected because there was no significant difference ($p > .05$) concerning the self-perceived impact or benefit of computer technology between the purchasers and the participant/purchasers.

Conclusions Related To Objective Eight, Hypothesis Six

The null hypothesis was rejected and it was concluded that there was a "moderate" relationship between the sets of variables listed below.

1. Ability to modify and incorporate software and level of use of farm business management tools.
2. Ability to modify and incorporate software and opinion leadership.
3. Self-perceived benefits of adopting computers and ability to modify and incorporate software .
4. Self-perceived benefits of adopting computers and level of use of farm business management tools.
5. Self-perceived benefits of adopting computers and opinion leadership.

Furthermore, it was concluded that only a "negligible" relationship existed between satisfaction with TAEX farm management software and the ability to modify and incorporate software.

While there was a "moderate" relationship between some of the sets of variables, it could not be concluded that the relationship was of a cause-and-effect nature.

Implications

Based on the major findings and conclusions of this study, a number of implications were formulated.

1. Because differences were found among the farming/ranching operations and demographic characteristics between the two study groups and the general Texas farming and ranching population, the implication exists that the perceptions and attitudes of the purchasers and the partici-

pant/purchasers are more positive toward the use of computer technology in their operations than those of the general population. Because of this possibility, before any efforts are made to extend computer management training programs to the general public, the perceptions of the general public should be determined. It may be found that the training needs of the general Texas population may be different from that of the two study groups. Ultimately, it may be found that the nature of the farming and ranching operations of those typically included in the general Texas population shows that those farmers and ranchers do not need to adopt computers.

2. Given the differences between the two study groups concerning their levels of satisfaction with TAEX farm management software, the implication exists that the participant/purchasers, by attending a short course, are able to utilize the software more effectively than the purchasers who have had no "hands on" practice with the software. An additional implication exists concerning the purchaser group. This group reported spending more money on training activities than did the participant/purchaser group, but they apparently received their training from sources other than TAEX. The implication exists that the TAEX short courses are viewed as inappropriate for this group's needs. Due to the above average level of

satisfaction expressed by those attending the short courses, the implication exists that the intensive three-day short courses were meeting the needs of those attending the courses.

3. While there was no difference between the purchasers and participant/purchasers concerning the level of use of farm business management tools, it should be remembered that 20% of the respondents indicated that they did not use any of the farm business management tools listed in this study. Therefore, the implication exists that this 20% is at a severe disadvantage in dealing with the present structural changes occurring in agriculture unless they rely on other professionals who provide these management services.
4. Because of the high levels of education reported, with more than 20% of the respondents reported as having a graduate degree, the implication exists that the members of the two study groups will continue to be knowledgeable about and to demand higher levels of farm management assistance than the typical producer. While this audience of farmers and ranchers is somewhat small, they require assistance currently available primarily through specialized assistance groups at the district and state levels of the Texas Agricultural Extension Service. Therefore, the implication exists that the traditional Extension system

of outreach with emphasis placed at the county level, may not be the best method of reaching better prepared or more knowledgeable farmers and ranchers, at least those with computerized farm management systems.

5. Two variables, ability to modify and incorporate software and level of use of farm business management tools, were found to have a "moderate" relationship with opinion leadership. Therefore, the implication exists that there may be a role for these opinion leaders in the educational efforts of the Extension Service. It may be possible to utilize opinion leader skills for testing software, teaching short courses, or just speaking at appropriate gatherings concerning the role of computers in their operations. Whatever the role is, the Extension Service should try to utilize the talent of these opinion leaders.
6. Because relationships were found to exist among several variable sets, there may be a need to do further research concerning the variables to determine if there is a cause and effect relationship.

Recommendations

Based on the findings, conclusions, and implications drawn from this study, the following recommendations were made concerning practical applications and areas for further study.

1. It is recommended that the Texas Agricultural Extension Service continue to offer farm management computer short courses. Further study should be undertaken to determine the need for short courses in mathematics, accounting, economics, and finance.
2. Due to the high levels of education and computer use reported by the respondents, it is recommended that the Texas Agricultural Extension Service put additional emphasis on upgrading the computer skills of local Extension personnel so that they may become more involved with the efforts of the Economist-Management Group.
3. Given the differences found between the general Texas farming and ranching population and the two study groups, additional research should be conducted to examine the general Texas farming and ranching population. This research should determine the present status of the population concerning the adoption of computers, and in particular, their needs for farm management training.
4. Because the purchaser group reported spending more money on training activities than did the participant/purchaser group, further study should be conducted to determine why the purchaser group does not attend TAEX short courses. It should be determined where these people are receiving their computer training.

Concluding Statement

The initial goal of the Economist-Management Group of the Texas Agricultural Extension Service was to provide computer-based management training for the large commercial farmers and ranchers of Texas. It is apparent from this study that this target audience is being served well. It should be noted that the respondents included in this study reported being satisfied with the both the training and software components of the project.

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